|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TOPIC: Preparing for Algebra** | | | | | | | Semester this  will be taught: **1** |
| **Enduring Understanding:** The fundamentals of Pre-Algebra are essential to the understanding and mastery of Algebra 1-2. | | | | | | |
| **Standard and**  **Related Concept** | **Performance Objectives** | **EIN** | Semester  **I/B** | **Essential Questions** | **Assessments** | **Resources**  G=Glencoe  C=Carnegie | **Collaboration and Integration** |
| Strand 1: Number and Operations.  Concept 1:Number Sense | PO 1. Justify with examples the relation between the number system being used (natural numbers, whole numbers, integers, rational numbers and irrational numbers) and the question of whether or not an equation has a solution in that number system. |  | **1/1** | How are the various number systems related? Not related?  How can the number line help us simplify integer operations?  What rules allow us to multiply and divide rational numbers?  Which measures of central tendency are appropriate for a given application?  How can one calculate the simple probability of an event?  Which type of graph or table is appropriate for representing a data set? |  | G: 0.2  C: 4.5 |  |
| PO 2. Sort sets of numbers as finite or infinite, and justify the sort. |  | **1/1** | G: 0.2  C: 4.5 (add) |
| PO 3. Express that the distance between two numbers is the absolute value of their difference. |  | **1/1** | G: 0.3  C: 3.6 (add) |
| Strand 1: Number and Operations.  Concept 2: Numerical Operations | PO1. Solve word problems involving absolute values, powers, roots and scientific notations. |  | **1/1** | G: 0.3  C: Throughout |
| Strand 1: Number and Operations.  Concept 3: Estimation. | PO 1 Determine rational approximations of irrational numbers. |  | **1/1** | G: 0.2  C: 8.4 |
| PO 3 Determine when an estimate is more appropriate than an exact answer. |  | **1/1** | G: 0.1  C: 8.4 |
| PO4. Estimate the location the location of the rational or irrational numbers on a number line. |  | **1/1** | G: 0.2  C: 4.5 |
| Strand 2: Data analysis probability and discrete math.  Concept 1: Data analysis | PO1. Draw inferences about data sets from lists, tables, matrices, and plots. |  | **1/1** | G: 0.12  C: 1.1-1.10 |
| P02. Organize collective data into an appropriate graphical representation with or without technology. |  | **1/1** | G: 0.13  C: 1.6, 1.7 |
| PO 4 Make inferences by comparing data sets using one or more summary statistics. |  | **1/1** | G: 0.12  C: 12.1 |
| Strand 2: Data analysis probability and discrete math.  Concept 3: Systematic listing and counting. | PO3. Determine the number of possible outcomes of an event. |  | **1/1** | G: 0.11  C: 11.1 |
| Strand 5: Structure and Logic  Concept 2: Logic, Reasoning, Problem solving, and Proofs. | PO2. Solve problems by formulating one or more strategies, applying the strategies, verifying the solution, and communicating the reasoning used to obtain the solution |  | **1/1** | G: 0.1  C: Throughout |

**Key Concepts: Key Vocabulary:**

box-and-whisker plot

natural number

whole number

integer

rational number

irrational number

real number

probability

sample space

Fundamental Counting Principle

mean, median, mode

frequency table

bar graph

histogram

Build a box-and-whisker plot for a given data set.

List the sample space of the following events:

a) a toss of two coins

b) a roll of a single die

If a lunch buffet offers 3 choices for your entrée, 3 choices for your drink, and 2 dessert choices, how many different lunches can be ordered?

a) Estimate to the nearest whole number.

What is the probability of rolling a 2 or 3 on a single die?

If event *M* can occur in *m* ways and is followed by event *N*  that can occur *n*  ways, then event *M*  and *N*  can occur ways.

The probability of an event is the ratio of favorable outcomes to total outcomes.

The product or quotient of two rational numbers having the same sign is positive. The product or quotient of two rational numbers having different signs is negative.

The measures of central tendency can be used to solve problems. Each has its more appropriate uses.

The real numbers are composed of the rational number system and the irrational number system. The rational numbers contain the natural, whole, and integer number systems.

**Essential Question(s):**

How are the various number systems related? Not related?

How can the number line help us simplify integer operations?

What rules allow us to multiply and divide rational numbers?

Which measures of central tendency are appropriate for a given application?

How can one calculate the simple probability of an event?

Which type of graph or table is appropriate for representing a data set?

**Examples:**

**Enduring Understanding:** The fundamentals of Pre-Algebra are essential to the understanding and mastery of Algebra 1-2.

Tables and graphs can be used to represent data sets. Each method has its relative strength and weakness.

TOPIC:

**Preparing for Algebra**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TOPIC: Expressions, Equations, and Functions** | | | | | | | Semester this  will be taught: **1** |
| **Enduring Understanding:** Expressions, equations, and functions are fundamental to the development of algebraic concepts. | | | | | | |
| **Standard and**  **Related Concept** | **Performance Objectives** | **EIN** | Semester  **I/B** | **Essential Questions** | **Assessments** | **Resources**  G=Glencoe  C=Carnegie | **Collaboration and Integration** |
| Strand 1: Number and Operations  Concept 2: Numerical Operations | PO 2. Summarize the properties of and connections between real number operations; justify manipulations of expressions using the properties of real number operations. |  | **1/1** | How do we apply the order of operations?  Can I identify the properties of equality?  How do we use the Distributive Property to simplify expressions or equations?  How do I identify if a relation is a function?  How do I evaluate functions? |  | G: 1.2, 1.3, 1.4  C: 4.4, 4.5 |  |
| Strand 3: Patterns, Algebra, and Functions  Concept 2: Functions and Relationships | PO 1. Sketch and interpret a graph that models a given context, make connections between the graph and the context, and solve maximum and minimum problems using the graph. |  | **1/1** | G: 1.6  C: 5.6 |
| PO 2. Determine if a relationship represented by an equation, graph, table, description, or set of ordered pairs is a function. |  | **1/1** | G: 1.7  C: 4.2 |
| PO 3. Use function notation; evaluate a function at a specified value in its domain. |  | **1/1** | G: 1.7  C: 4.3 |
| Strand 3: Patterns, Algebra, and Functions  Concept 3: Algebraic Representations | PO 1. Create and explain the need for equivalent forms of an equation or expression. |  | **1/1** | G: 1.1, 1.5  C: 5.1 |

**Key Concepts: Key Vocabulary:**

algebraic expression

distributive property

variable

function

like terms

order of operations

reflexive property

associative property

term

vertical line test

commutative property

identity properties

Simplify:

a)

b) 3

c) 5+3

Identify the property:

a)

b)

c)

d)

e)

f)

Explain how one would use the Vertical Line Test to determine if a graph represents a function.

**Examples:**

**Essential Question(s):**

How do we apply the order of operations?

Can I identify the properties of equality?

How do we use the Distributive Property to simplify expressions or equations?

How do I identify if a relation is a function?

How do I evaluate functions?

**Enduring Understanding:**

Expressions, equations, and functions are fundamental to the development of algebraic concepts.

Order of Operations is important to simplify certain expressions.

Algebraic expressions can be simplified by using properties of equality and identities.

Equation notation connects function notation.

Equations are easily solved and evaluated in certain situations.

For every y value, there is only one x value, which makes a relation a function.

TOPIC:

**Expressions, Equations, and Functions**

Simplify:

a)

b)

c)

coefficient

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TOPIC: Linear Equations** | | | | | | | Semester this  will be taught: **1** |
| **Enduring Understanding:** The ability to solve equations allows one to find an unknown quantity. | | | | | | |
| **Standard and**  **Related Concept** | **Performance Objectives** | **EIN** | Semester  **I/B** | **Essential Questions** | **Assessments** | **Resources**  G=Glencoe  C=Carnegie | **Collaboration and Integration** |
| Strand 3: Patterns algebra and functions  Concept 2: Functions and Relationships | PO 4 Use equations, graphs, tables, descriptions or sets of ordered pairs to express a relationship between two variables. |  | **1/1** | How are inverse operations used to solve equations?  How are ratios used to solve proportions? |  | G: 2.9  C: Throughout |  |
| Strand 3: Patterns algebra and functions  Concept 3: Algebraic representations | PO 1 Create and explain the need for equivalent forms of an equation or expression |  | **1/1** | G: 2.2,2.3,2.4,2.5,2.7  C: 3.1-3.8 |
| PO 2 Solve formulas for specified variables. |  | **1/1** | G: 2.8  C: 5.8 |
| PO 5 Solve linear equations and equations involving absolute value, with one variable. |  | **1/1** | G: 2.2,2.3,2.4,2.5  C: 3.1-3.8 |
| PO8. Simplify and evaluate polynomials, rational expressions, expressions containing absolute value, and radicals. |  | **1/1** | G: 2.5  C: 4.7 |
| Strand 3: Patterns algebra and functions Concept 4: Analysis of change. | PO3. Solve interest problems |  | **1/1** | G: 2.1,2.8  C: 2.6, 2.7 |
| Strand 4: Geometry and measurement  Concept 4: Measurement | PO 1. Use dimensional analysis to keep track of units of measure when converting. |  | **1/1** | G: 2.8  C: 2.3 |
| PO4.Solve problems involving similar figures using ratios and proportions |  | **1/1** | G: 2.6  C: 2.3 |

**Key Concepts: Key Vocabulary:**

Solve:

a)

b)

Solve for :

Solve:

a)

b)

c)

Solve:

a)

b)

Find the discounted price:

a) software: $64

discount: 20%

**Examples:**

**Essential Question(s):**

How are inverse operations used to solve equations?

How are ratios used to solve proportions?

**Enduring Understanding:**

The ability to solve equations allows one to find an unknown quantity.

If an equation is true and the same number is added to or subtracted from each side, the resulting equation is true.

If an equation is true and each side is multiplied or divided by the same nonzero number, the resulting equation is true.

Percent of change is the ratio of the change in an amount to the original amount expressed as a percent.

Isolating a variable represents the solution of an equation.

extremes/means

formula

literal equation

multi-step equations

percent of change

percent of increase/decrease

proportion

ratio

solve

weighted average

TOPIC:

**Linear Equations**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TOPIC: Linear Functions** | | | | | | | Semester this  will be taught: **1** |
| **Enduring Understanding:** Graphing a linear function allows us to model real world situations and visualize the relationship between two variables. | | | | | | |
| **Standard and**  **Related Concept** | **Performance Objectives** | **EIN** | Semester  **I/B** | **Essential Questions** | **Assessments** | **Resources**  G=Glencoe  C=Carnegie | **Collaboration and Integration** |
| Strand 3: Patterns, Algebra, and Functions  Concept 1: Patterns | PO 1. Recognize, describe, and analyze sequences using tables, graphs, words, or symbols; use sequences in modeling. |  | **1/1** | How do we find the zeros/intercepts of a linear equation?  How are the solutions of an equation related to the graph of a function?  How can we use linear functions to represent real world situations? |  | G: 3.5  C: 1.1-1.4 |  |
| PO 2. Determine a specific term of a sequence. |  | **1/1** | G: 3.5  C: 1.2 |
| PO3. Create sequences using explicit and recursive formulas involving both subscripts and function notation. |  | **1/1** | G: 3.5  C: 1.4 |
| Strand 3: Patterns, Algebra, and Functions  Concept 2: Functions and Relationships | PO 4. Use equations, graphs, tables, descriptions, or sets of ordered pairs to express a relationship between two variables. |  | **1/1** | G: 3.6  C: 5.1-5.8 |
| PO 7. Determine domain and range of a function from an equation, graph, table, description, or set of ordered pairs. |  | **1/1** | G: 3.2  C: 4.3 |
| Strand 3: Patterns, Algebra, and Functions  Concept 4: Analysis of Change | PO1. Determine the slope and intercepts of the graph of a linear function, interpreting slope as a constant rate of change. |  | **1/1** | G: 3.1, 3.3  C: 5.2, 5.3 |
| PO 2. Solve problems involving rate of change. |  | **1/1** | G: 3.3  C: 5.3 |
| Strand 4: Geometry and Measurement  Concept 3: Coordinate Geometry | PO 5. Graph a linear equation or linear inequality in two variables. |  | **1/1** | G: 3.1, 3.2  C: 5.1-5.8, 7.8 |
| Strand 5: Structure and Logic  Concept 2: Logic, Reasoning, Problem Solving, and Proof | PO 2. Solve problems by formulating one or more strategies, applying the strategies, verifying the solution(s), and communicating the reasoning used to obtain the solution(s). |  | **1/1** | G: 3.4  C: Throughout |

**Key Concepts: Key Vocabulary:**

The common difference of an arithmetic sequence is the slope/rate of change of a linear function.

If x is the independent variable and y is the dependent variable, then the rate of change (slope) equals .

\*The slope of a line is the ratio of the rise to the run.

Values of x for which f(x)=0 are called zeros of the function f. The zero of a function is located at the x-intercept of the graph of the function.

sequence

Find the common difference of the sequence:

Is the following sequence arithmetic?

Find the slope between the points:

a)

b)

Find the *x* & *y* intercepts:

a)

b)

Solve by graphing:

a)

**Examples:**

**Essential Question(s):**

How do we find the zeros/intercepts of a linear equation?

How are the solutions of an equation related to the graph of a function?

How can we use linear functions to represent real world situations?

**Enduring Understanding:**

Graphing a linear function allows us to model real world situations and visualize the relationship between two variables.

arithmetic sequences

common difference

constant

direct variation

linear equation

linear function

rate of change

root

standard form

x-intercept

y-intercept

zero

TOPIC:

**Linear Functions**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TOPIC: Linear Functions and Relations** | | | | | | | Semester this  will be taught: **1** |
| **Enduring Understanding:** Graphing a relationship allows us to model real world situations and visualize the relationship between two variables. | | | | | | |
| **Standard and**  **Related Concept** | **Performance Objectives** | **EIN** | Semester  **I/B** | **Essential Questions** | **Assessments** | **Resources**  G=Glencoe  C=Carnegie | **Collaboration and Integration** |
| Strand 2: Data analysis probability and discrete mathematic  Concept 1: Data analysis and statistics | PO 1 Draw inferences about data sets from lists, matrices tables and plots. |  | **1/1** | How are the solutions of an equation related to the graph of a function?  What is the relationship between the graph, the equation and the table of values?  What is the purpose of the line of best fit? |  | G: 4.5  C: 6.2 |  |
| PO 3 Display data including paired data as lists, tables, matrices and plots with or without technology. Make predictions and observations about patterns and departures from patterns. |  | **1/1** | G: 4.5  C: 11.3 |
| Strand 3: Patterns algebra and functions  Concept 2: Functions and Relations | PO 7 Determine domain and range of a function from an equation, graph, table, set of ordered pairs and description. |  | **1/1** | G: 4.7  C: 4.3 |
| Strand 3: Patterns algebra and functions  Concept 3: Algebraic representations | PO 3 Write an equation given a table of values, two points on a line, the slope and a point, or the graph of a line. |  | **1/1** | G: 4.2, 4.3  C: 5.5,5.7 |
| PO 4 Determine from two linear equations whether the lines are parallel, perpendicular, coinciding or intersecting but not perpendicular. |  | **1/1** | G: 4.4  C: 7.2 |
| Strand 4: Geometry and measurement.  Concept 3: Coordinate geometry | PO 4 Verify characteristics of a given geometric figure using coordinate formulas for distance, midpoint and slope to confirm parallelism perpendicularity and congruency. |  | **1/1** | G: 4.1, 4.4, 4.5  C: 7.2, 13.2 |
| PO 5 Graph linear equation or linear inequality in two variables. |  | **1/1** | G: 4.1  C: 7.8 |
| PO 6. Describe how changing the parameters of a linear function affect the shape and position of its graph. |  | **1/1** | G: 4.1  C: 5.4 |

**Key Concepts: Key Vocabulary:**

Graph the equation:

a)

b)

c)

Line of best fit

Positive/Negative correlation

If you are given two points, you can use the slope formula to find slope.

Write an equation of a line in slope-intercept form that passes through the given points (1, 4) and (3, 10).

**Examples:**

**Essential Question(s):**

How are the solutions of an equation related to the graph of a function?

What is the relationship between the graph, the equation and the table of values?

What is the purpose of the line of best fit?

**Enduring Understanding:**

Graphing a relationship allows us to model real world situations and visualize the relationship between two variables.

Slope-intercept form can be used to identify the slope and y-intercept of a line.

A scatter plot is a graph in which two sets of data are plotted as ordered pairs in a coordinate plain.

Two points, a point and a slope, the slope and the y-intercept, a graph, and a table of values can be used to write equations.

Slope-intercept form

Point-slope form

Slope

x and y intercepts

Parallel lines

Perpendicular lines

Scatter plot

Line of best fit

Absolute value function

Coinciding lines

Transformation

TOPIC:

**Linear Functions and Relations**

Write an equation in slope-intercept form for the line that passes through and is perpendicular to the graph .

Write an equation in slope-intercept form for the line that passes through pt. and is parallel to .

Lines can be classified as parallel, perpendicular, coinciding, or intersecting but not parallel by identifying slope and intercept.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TOPIC: Linear Inequalities** | | | | | | | Semester this  will be taught: **1** |
| **Enduring Understanding:** Linear inequalities help us model and problem solve real world situations. | | | | | | |
| **Standard and**  **Related Concept** | **Performance Objectives** | **EIN** | Semester  **I/B** | **Essential Questions** | **Assessments** | **Resources**  G=Glencoe  C=Carnegie | **Collaboration and Integration** |
| Strand 3: Patterns, Algebra, and Functions  Concept 2: Functions and Relationships | PO 1. Sketch and interpret a graph that models a given context, make connections between the graph and the context, and solve maximum and minimum problems using the graph. |  | **1/1** | What are the similarities and differences in solving linear equations and linear inequalities?  What are the similarities and differences in graphing linear functions and linear inequalities? |  | G: 5.6  C: Throughout |  |
| PO 7. Determine domain and range of a function from an equation, graph, table, description, or set of ordered pairs. |  | **1/1** | G: 5.3  C: 4.3 |
| Strand 3: Patterns, Algebra, and Functions  Concept 3: Algebraic Representations | PO 5. Solve linear equations and equations involving absolute value with one variable. |  | **1/1** | G: 5.1  C: 4.1- 4.7 |
| PO 6. Solve linear inequalities in one variable |  | **1/1** | G: 5.1,5.2,5.3,5.4,5.5  C: 4.1 |
| PO 8. Simplify and evaluate polynomials, rational expressions, expressions containing absolute value and radicals |  | **1/1** | G: 5.5  C: 4.7 |
| Strand 4: Geometry and Measurement.  Concept 3: Coordinate Geometry | PO 5. Graph a linear equation or linear inequality in two variables. |  | **1/1** | G: 5.6  C: 7.1- 7.9 |

**Key Concepts: Key Vocabulary:**

Solve:

a)

b)

c)

d)

Graph:

a)

b)

**Examples:**

**Essential Question(s):**

What are the similarities and differences in solving linear equations and linear inequalities?

What are the similarities and differences in graphing linear functions and linear inequalities?

**Enduring Understanding:**

Linear inequalities help us model and problem solve real world situations.

If an inequality is true and the same number is added to or subtracted from each side, the resulting inequality is true.

If an inequality is true and each side is multiplied or divided by the same nonzero number, the resulting inequality is true.

A compound inequality containing *and* is only true if both inequalities are true.

A compound inequality containing *or* is true if at least one of the inequalities is true.

The “answer” to linear inequalities represents an infinite number of solutions.

closed half-plane

compound inequality

half plane

intersection

open half-plane

shading

union

TOPIC:

**Linear Inequalities**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TOPIC: Systems of Linear Equations and Inequalities** | | | | | | | Semester this  will be taught: **2** |
| **Enduring Understanding:** Graphing a relationship allows us to model real world situations and visualize the relationship between two variables. | | | | | | |
| **Standard and**  **Related Concept** | **Performance Objectives** | **EIN** | Semester  **I/B** | **Essential Questions** | **Assessments** | **Resources**  G=Glencoe  C=Carnegie | **Collaboration and Integration** |
| Strand 1: Number and Operations  Concept 3: Estimation | PO 2. Use estimation to determine the reasonableness of a solution. |  | **2/2** | How are the solutions of an equation related to the graph of the function?  What is the relationship between the graph and the equation?  How can we represent data using matrices?  How does a graph give you a visual representation of system of inequalities? |  | G: 6.8 |  |
| Strand 2: Data analysis probability and discrete math  Concept 1: Data analysis | PO 1. Draw inferences about data sets from lists, tables, matrices, and plots. |  | **2/2** | G: 6.6  C: 6.2 |
| PO 3. Display data, including paired data, as lists, tables, matrices, and plots with or without technology; make predictions and observations about patterns or departures from patterns. |  | **2/2** | G: 6.6  C: Throughout |
| Strand 3: Patterns, Algebra, and Functions  Concept 2: Functions and Relationships | PO 1. Sketch and interpret a graph that models a given context, make connections between the graph and the context, and solve maximum and minimum problems using the graph. |  | **2/2** | G: 6.8  C: 1.6- 1.10 |
| PO 5. Recognize and solve problems that can be modeled using a system of two equations in two variables. |  | **2/2** | G: 6.2,6.3,6.4,6.5  C: 7.1 – 7.7 |
| Strand 3: Patterns, Algebra, and Functions  Concept 3: Algebraic Representations | PO7. Solve systems of two linear equations in two variables. |  | **2/2** | G: 6.1,6.2,6.3,6.4,6.5  C: 7.1 – 7.7 |
| PO 15. Solve problems using operations with matrices. |  | **2/2** | G: 6.6  C: Supplement |
| Strand 4: Geometry and Measurement  Concept 3: Coordinate Geometry | PO 7. Determine the solution to a system of linear equations in two variables from the graphs of the equations. |  | **2/2** | G: 6.1  C: 7.1, 7.2 |

**Key Concepts: Key Vocabulary:**

TOPIC:

**Systems of Linear Equations and Inequalities**

Systems of Inequalities

Elimination

Inconsistent

Independent

Matrix

Scalar

Scalar Multiple

Substitution

System of Equations

Element

Dimension

Dependent

Consistent

Augmented Matrix

Solve this system using the substitution method:

Graph the system of inequalities:

Graph and classify this system:

Solve this system using the elimination method:

**Examples:**

**Essential Question(s):**

How are the solutions of an equation related to the graph of the function?

What is the relationship between the graph and the equation?

How can we represent data using matrices?

How does a graph give you a visual representation of system of inequalities?

**Enduring Understanding:**

Graphing a relationship allows us to model real world situations and visualize the relationship between two variables.

Substitution, elimination, and matrices are methods of solving systems.

Matrices provide a way to organize data, and they can be added or subtracted only if they have the same dimensions.

Solving systems of linear equations and linear inequalities using graphs and algebraic models are ways to solve systems.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TOPIC: Polynomials** | | | | | | | Semester this  will be taught: **2** |
| **Enduring Understanding:** The properties of monomials and polynomials are a key component of simplifying expressions and solving equations. | | | | | | |
| **Standard and**  **Related Concept** | **Performance Objectives** | **EIN** | Semester  **I/B** | **Essential Questions** | **Assessments** | **Resources**  G=Glencoe  C=Carnegie | **Collaboration and Integration** |
| Strand 1: Number and Operations  Concept 2: Numerical operations. | PO 1. Solve word problems involving absolute value, powers, roots, and scientific notation. |  | **2/2** | How do you perform operations involving monomials and polynomials?  How do you simplify algebraic expressions involving monomials and polynomials? |  | G: 7.3, 7.4  C: Throughout |  |
| PO 4 Compute using scientific notation |  | **2/2** | G: 7.3  C: 9.4 |
| Strand 3: Patterns Algebra and Functions  Concept 3: Algebraic representations | PO 8. Simplify and evaluate polynomials, rational expressions, expressions containing absolute value, and radicals. |  | **2/2** | G: 7.4, 7.5, 7.6, 7.7  C: 10.1-10.6 |
| PO 9. Multiply and divide monomial expressions with integer exponents. |  | **2/2** | G: 7.1, 7.2  C: 10.3, 10.4 |
| PO 10. Add subtract and multiply polynomial and rational expressions. |  | **2/2** | G: 7.5, 7.6, 7.7, 7.8  C: 10.2, 10.6 |

**Key Concepts: Key Vocabulary:**

Laws of monomials and exponents including multiplying, dividing, and power of a power must be applied to certain expressions.

Multiply:

Simplify:

**Examples:**

**Essential Question(s):**

How do you perform operations involving monomials and polynomials?

How do you simplify algebraic expressions involving monomials and polynomials?

**Enduring Understanding:**

The properties of monomials and polynomials are a key component of simplifying expressions and solving equations.

Monomials can be simplified using properties of negative and zero exponents.

Operations in scientific notation involve laws of exponents and adjusting the decimal when necessary.

Polynomials and monomials can be multiplied by using the distributive property.

The distributive property can be used to multiply polynomials. FOIL can be used when both are binomials.

Dividing polynomials by a binomial and monomial simplifies expressions.

Binomial

Constant

Degree of a polynomial

FOIL

Leading coefficient

Monomial

Polynomial

Power of a Power

Scientific Notation

Trinomial

TOPIC:

**Polynomials**

Multiply/Divide:

a)

b)

Simplify:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TOPIC: Factoring and Quadratic Equations** | | | | | | | Semester this  will be taught: **2** |
| **Enduring Understanding:** Quadratic equations are essential for modeling certain real world situations, particularly maximum and minimum values. | | | | | | |
| **Standard and**  **Related Concept** | **Performance Objectives** | **EIN** | Semester  **I/B** | **Essential Questions** | **Assessments** | **Resources**  G=Glencoe  C=Carnegie | **Collaboration and Integration** |
| Strand 1: Numbers and operations  Concept 3: Estimation | PO 2. Use estimation to determine the reasonableness of a solution |  | **2/2** | How can we use Distributive Property to factor polynomials?  How do we factor common quadratic trinomials?  What special factoring patterns can we look for in quadratic equations? |  | G: 8.1  C: |  |
| Strand 3: Patterns Algebra and Functions  Concept 3: Algebraic representations | PO 8. Simplify and evaluate polynomials, rational expressions, and expressions containing absolute value and radicals. |  | **2/2** | G: 8.1  C: 4.7, 10.6 |
| PO 12. Factor quadratic polynomials in the form of where a, b, and c are integers. |  | **2/2** | G: 8.2, 8.3  C: 10.5 |
| PO 13. Solve quadratic equations. |  | **2/2** | G: 8.3, 8.4, 8.5, 8.6  C: 8.6 |
| PO14. Factor higher order polynomials. |  | **2/2** | G: 8.2, 8.3  C: 10.5 |

**Key Concepts: Key Vocabulary:**

Solve:

a)

b)

c)

Factor:

a)

b)

c)

d)

e)

f)

**Examples:**

**Essential Question(s):**

How can we use Distributive Property to factor polynomials?

How do we factor common quadratic trinomials?

What special factoring patterns can we look for in quadratic equations?

**Enduring Understanding:**

Quadratic equations are essential for modeling certain real world situations, particularly maximum and minimum values.

Factoring allows us to find the solutions/zeros of a function.

The solutions to a quadratic are the zeros/roots of the graph.

difference of two squares

factored form

factoring

factoring by grouping

greatest common factor

perfect square trinomials

prime polynomial

quadratic equation

Zero Product Property

TOPIC:

**Factoring and Quadratic Equations**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TOPIC: Quadratic and Exponential Functions** | | | | | | | Semester this  will be taught: **2** |
| **Enduring Understanding:** Understanding quadratic functions can help enable you to model certain real world situations. | | | | | | |
| **Standard and**  **Related Concept** | **Performance Objectives** | **EIN** | Semester  **I/B** | **Essential Questions** | **Assessments** | **Resources**  G=Glencoe  C=Carnegie | **Collaboration and Integration** |
| Strand 3: Patterns algebra and functions.  Concept 1: Patterns | PO 1. Recognize, describe, and analyze sequences using tables, graphs, words, or symbols; use sequences in modeling. |  | **2/2** | How can quadratics be used to model real world problems?  Why can quadratic equations have multiple zero, one, or two solutions? |  | G: 9.8, 9.9  C: 1.1-1.4 |  |
| PO 2. Determine a specific term of a sequence. |  | **2/2** | G: 9.8  C: 1.2 |
| Strand 3: Patterns algebra and functions.  Concept 2: Functions and Relationships | PO 1. Sketch and interpret a graph that models a given context, make connections between the graph and the context, and solve maximum and minimum problems using the graph. |  | **2/2** | G: 9.3  C: 8.2 |
| PO 6. Recognize and solve problems that can be modeled using a quadratic function. |  | **2/2** | G: 9.1, 9.4, 9.5  C: 8.1-8.8 |
| Strand 3: Patterns algebra and functions.  Concept 3: Algebraic representation. | PO 13. Solve quadratic equations. |  | **2/2** | G: 9.2,9.4, 9.5  C: 8.5, 8.6 |
| Strand 4: Geometry and Measurement  Concept 3: Coordinate geometry | PO 8. Graph a quadratic function and interpret *x*-intercepts as zeros. |  | **2/2** | G: 9.1, 9.2  C: 8.2 (add zeros) |

**Key Concepts: Key Vocabulary:**

**Enduring Understanding:**

Understanding quadratic functions can help enable you to model certain real world situations.

General forms of quadratic functions can be identified and sketched.

Quadratic functions model real life situations

Axis of symmetry

Completing the square

Discriminant

Maximum

Minimum

Nonlinear function

Parabola

Quadratic equation

Quadratic Formula

Standard form

Translation

Vertex

Symmetry

TOPIC:

**Quadratic and Exponential Functions**

A juggler is tossing a ball into the air. The height of the ball in feet can be modeled by the equation , where y represents the height of the ball at x seconds.

1. Graph this equation.
2. At what height is the ball thrown?
3. What is the maximum height of the ball?

Graph the following quadratic and find min/max:

a)

b)

Solve the quadratic by:

a) Factoring

b) Quadratic Formula

**Examples:**

**Essential Question(s):**

How can quadratics be used to model real world problems?

Why can quadratic equations have multiple zero, one, or two solutions?

Graphing, factoring, difference of squares, and using the quadratic formula are all ways in which quadratic equations can be solved.

Connections can be made among the solutions of quadratic equations, the zeros of their related functions and the horizontal intercepts of the graph of the function.

Conclusions can be drawn from the analysis of graphs of quadratic functions.

|  |  |  |  |  |  |  |  |
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| **TOPIC: Radical Functions and Geometry** | | | | | | | Semester this  will be taught: **2** |
| **Enduring Understanding:** The properties of radicals are key components of simplifying expressions in order to solve geometric problems. | | | | | | |
| **Standard and**  **Related Concept** | **Performance Objectives** | **EIN** | Semester  **I/B** | **Essential Questions** | **Assessments** | **Resources**  G=Glencoe  C=Carnegie | **Collaboration and Integration** |
| Strand 1: Numbers and operations.  Concept 2: Numerical operations. | PO 3. Calculate powers and roots of rational and irrational numbers. |  | **2/2** | How can you illustrate the transformations of radical equations?  Why is it important to simplify radical expressions?  When is it necessary to check for extraneous solutions?  How can you find the distance and midpoint using a coordinate plane system?  How can we find the missing side of a right triangle? |  | G: 10.2  C: 9.1, 9.6 |  |
| Strand 3: Patterns Algebra and Functions.  Concept 2: Functions and relationships. | PO. 7 Determine domain and range of a function from an equation, graph, table, description, or set of ordered pairs. |  | **2/2** | G: 10.1  C: 4.3 |
| Strand 3: Patterns Algebra and Functions.  Concept 3: Algebraic representation. | PO. 8 Simplify and evaluate polynomials, rational expressions, expressions containing absolute values and radicals. |  | **2/2** | G: 10.1, 10.2, 10.3, 10.4, 10.5  C: 9.1 – 9.6,  10.1 – 10.6, 4.7 |
| PO 11 Solve square root equations with only one radical. |  | **2/2** | G: 10.4  C: Supplement |
| Strand 4: Geometry and Measurement.  Concept 3: Coordinate geometry. | PO 1. Determine how to find the midpoint between two points in the coordinate plane. |  | **2/2** | G: 10.6  C: 13.2 |
| PO 2. Illustrate the connection between the distance formula and the Pythagorean Theorem. |  | **2/2** | G: 10.5  C: 13.2, 13.3 |
| PO 3. Determine the distance between two points in the coordinate plane. |  | **2/2** | G: 10.6  C: 13.2 |

**Key Concepts: Key Vocabulary:**

Graph the function and describe the transformation to the parent function:

Rationalizing the Denominator

Square Root Function

Radicals

Midpoint

Hypotenuse

Extraneous Solution

Distance Formula

Conjugate

**Examples:**

**Essential Question(s):**

How can you illustrate the transformations of radical equations?

Why is it important to simplify radical expressions?

When is it necessary to check for extraneous solutions?

How can you find the distance and midpoint using a coordinate plane system?

How can we find the missing side of a right triangle?

**Enduring Understanding:**

The properties of radicals are key components of simplifying expressions in order to solve geometric problems.

Parameters of square root functions change the graph in specific ways.

Radicals must be simplified in order to perform certain operations.

The key idea for radical equations is to isolate the variable.

Distance and midpoint of two points can be found on a coordinate plane.

Pythagorean theorem states that we can find a missing side of a right triangle by applying a formula.

TOPIC:

**Radicals Functions and Geometry**

Maria and Jackson are neighbors. If they superimpose a coordinate grid on a map of the neighborhood and Maria lives at , Jackson lives at

1. How far do they live from each other?
2. What are the coordinates of the point in the middle of their houses?

Simplify:

Solve:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TOPIC: Rational Functions and Equations** | | | | | | | Semester this  will be taught: **2** |
| **Enduring Understanding:** Understanding rational expressions is a building block into furthering mathematical concepts. | | | | | | |
| **Standard and**  **Related Concept** | **Performance Objectives** | **EIN** | Semester  **I/B** | **Essential Questions** | **Assessments** | **Resources**  G=Glencoe  C=Carnegie | **Collaboration and Integration** |
| Strand 3: Patterns, Algebra, and Functions  Concept 2: Functions and Relationships | PO 1. Sketch and interpret a graph that models a given context, make connections between the graph and the context, and solve maximum and minimum problems using the graph |  | **2/2** | How are operating with rational expressions operating with fractions? |  | G: 11.1  C: 8.2 |  |
| PO 7. Determine domain and range of a function from an equation, graph, table, description, or set of ordered pairs. |  | **2/2** |  | G: 11.2  C: 4.3 |  |
| Strand 3: Patterns Algebra and Functions  Concept 3: Algebraic representations | PO 8. Simplify and evaluate polynomials, rational expressions, expressions containing absolute value, and radicals. |  | **2/2** | G: 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8  C: 9.1 – 9.6, 10.1 – 10.6, 4.7 |
| PO 10. Add, subtract, and multiply polynomial and rational expressions. |  | **2/2** | G: 11.4, 11.6.  C: 9.1 – 9.6 |
| Strand 5: Structure and Logic  Concept 2: Logic, Reasoning, Problem Solving, and Proof | PO 2. Solve problems by formulating one or more strategies, applying the strategies, verifying the solution(s), and communicating the reasoning used to obtain the solution(s). |  | **2/2** | G: 11.5  C: Throughout |
| PO 3. Evaluate a solution for reasonableness and interpret the meaning of the solution in the context of the original problem. |  | **2/2** | G: 11.8  C: 10.6 |

**Key Concepts: Key Vocabulary:**

**Examples:**

**Essential Question(s):**

How are operating with rational expressions operating with fractions?

**Enduring Understanding:**

Understanding rational expressions is a building block into furthering mathematical concepts.

Tables, graphs, or algebraic methods are ways to analyze data and represent situations involving inverse variations.

Least common denominator

Least common multiple

Rational expression

Rational equation

Rational function

TOPIC:

**Rational Functions and Equations**

Simplify:

a)

b)

c)

Operations with rational expressions must be performed to simplify.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TOPIC: Statistics and Probability** | | | | | | | Semester this  will be taught: **2** |
| **Enduring Understanding:** Understanding how to design and interpret a fair and accurate survey. | | | | | | |
| **Standard and**  **Related Concept** | **Performance Objectives** | **EIN** | Semester  **I/B** | **Essential Questions** | **Assessments** | **Resources**  G=Glencoe  C=Carnegie | **Collaboration and Integration** |
| Strand 2: Data Analysis, Probability, and Discrete Mathematics  **Concept 1: Data Analysis** | PO 5. Determine which measure of center is most appropriate in a given situation and explain why. |  | **2/2** | Why do we design surveys?  How can a survey help you interpret data? |  | G: 12.2  C: 12.1 |  |
| PO 6. Evaluate the reasonableness of conclusions drawn from data analysis.  . |  | **2/2** | G: 12.2  C: 12.2 |
| PO 7. Identify misrepresentations and distortions in displays of data and explain why they are misrepresentations or distortions. |  | **2/2** | G: 12.1, 12.2  C: 11.9, 12.2 |

**Key Concepts: Key Vocabulary:**

**Examples:**

**Essential Question(s):**

Why do we design surveys?

How can a survey help you interpret data?

**Enduring Understanding:**

Understanding how to design and interpret a fair and accurate survey.

Sampling techniques must be understood in order to construct a survey and analyze the results.

Samples are often classified as biased or unbiased.

Sample

Biased/unbiased sample

Random

Quantitative data

Qualitative data

TOPIC:

**Statistics and Probability**

Jason conducts a survey about the number of pets his friends have he wants the best representation of the number of pets. Which measure of central tendency should he use?

To determine whether voters support a new trade agreement, 5 people from the list of registered voters in each state and in the District of Colombia are selected at random. Is this sample biased or unbiased?